PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : A61F 13/00 — A1

(11) International Publication Number: WO 97/34553

(43) International Publication Date: 25 September 1997 (25.09.97)

(21) International Application Number: PCT/GB97/00784

(22) International Filing Date: 20 March 1997 (20.03.97)

(30) Priority Data:
9605863.1 20 March 1996 (20.03.96) GB

(71)(72) Applicant and Inventor: NOTARAS, Mitchell, James [AU/GB]; 7 Blenheim Road, London NW8 0LU (GB).

(74) Agent: GILL JENNINGS & EVERY; Broadgate House, 7 Eldon Street, London EC2M 7LH (GB).

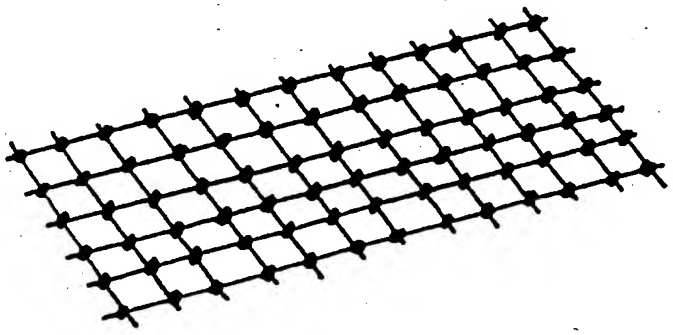
(81) Designated States: JP, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

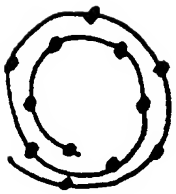
Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: BANDAGE

(57) Abstract

An elongate strip of an integral reticulated elastomeric polymer material, in which the mesh dimension thereof is substantially larger than the filaments, and which has surface protuberances, is appropriate for therapeutic use as a bandage by wrapping it around a body part so that layers thereof are superimposed and interlock without occlusion of the body.





FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania
AM	Armenia
AT	Austria
AU	Australia
AZ	Azerbaijan
BA	Bosnia and Herzegovina
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
BY	Belarus
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CN	China
CU	Cuba
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GH	Ghana
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IL	Israel
IS	Iceland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgyzstan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakstan
LC	Saint Lucia
LI	Liechtenstein
LK	Sri Lanka
LR	Liberia
LS	Lesotho
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
MK	The former Yugoslav Republic of Macedonia
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
MX	Mexico
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SG	Singapore
SI	Slovenia
SK	Slovakia
SN	Senegal
SZ	Swaziland
TD	Chad
TG	Togo
TJ	Tajikistan
TM	Turkmenistan
TR	Turkey
TT	Trinidad and Tobago
UA	Ukraine
UG	Uganda
US	United States of America
UZ	Uzbekistan
VN	Viet Nam
YU	Yugoslavia
ZW	Zimbabwe

BANDAGE

Field of the Invention

The invention relates to a new application of a non-woven integral elasticised sheet net material as a bandage.

Background of the Invention

Surgical dressings and plasters have been developed for the following purposes:

1. The protection of the healing wound.
2. The prevention of contamination of the environment with wound exudate which may contain bacteria.
3. The retention of a dressing or a medicament in contact with the surface of the body.
4. The restriction of movement of part of the body by traction or compression.
5. By maintaining compression, the prevention of accumulation of tissue fluid in a dependent part.

There is no ideal product. Choice will be a compromise and will depend on an appreciation of the salient features of the anatomy and physiology or normal skin and the conditions to which it will be exposed.

Skin is normally infested with bacteria which present no problem to the host, provided that normal environment of the skin is maintained and the openings of the hair follicles and the ducts of the sweat glands are not occluded. Besides being permeable to the water lost by active sweating, the epidermis is permeable to water vapour and gases. In injuries where the epidermis is removed, the loss per unit area may increase tenfold. Under normal conditions, the surface temperature of the skin is less than body temperature. Occlusion of the surface of the skin not only prevents the evaporation of water vapour and a rise of surface temperature, but causes a quantitative increase in the bacterial flora. Bacteriological studies have shown that under a microporous water vapour-permeable dressing, the quantitative bacterial count is less than

under occlusive dressings, and the incidence of recovery of pathogenic organisms is greatly reduced.

Wounds under dressings heal in artificial conditions. This is an important factor, when drawing conclusions about the effect of a dressing on healing. Studies of wound healing have raised substantial doubt regarding the biological desirability of the widespread practice of merely cleansing a small wound and exposing it to drying air without some type of cover.

Present roll-on bandages, of the type that may be wrapped around a body part, may be divided into:

(a) Bandages made of various knitted fabrics such as cotton or synthetic materials. These bandages have minimal stretch. They are typically fixed with an adherent tape or safety pin or a supplied fixation device. An example is Kling marketed by Johnson & Johnson.

These bandages easily loosen with movement and often have to be reapplied. Multi-overlapping of even these porous bandages will greatly reduce, if not completely abolish, their porosity.

Many woven bandages can be stretched along their length but do not stretch sideways. These products are most commonly used to retain dressings in position or in the treatment of sprains to restrict movement, to limit oedema in dependent parts and to hold large dressings in position. They are commonly known as supporting bandages.

(b) Bandages made of various knitted fabrics which include an elastic component which allow the bandage to be applied with some compression or tightness, to conform and maintain pressure on the area, e.g. a limb. An example is Elastocrepe marketed by Smith & Nephew. They have the same disadvantages as for (a).

(c) Elasticised knitted fabric bandages with an adhesive on one side. The adhesive material fixes to the skin and between layers. An example is Elastoplast marketed by Smith & Nephew.

Again, their overlapping will greatly reduce, if not completely abolish, their porosity. Their unwinding is frequently difficult. Also, removal of the layer of bandage adherent to the skin is painful.

The adhesive tends to perish with time, with a consequent loss of its adhesive properties. Some patients react to certain dressing adhesives, particularly when they are applied to regions of the body other than the hand.

Because of movement of the tissues, or when plasters or strapping are used to apply stresses to the body, for example orthopaedic strapping, the use of adhesive may cause considerable stresses and strains to develop at the adhesive/epidermal interface within the epidermis and at the epidermal/dermal junction, which may result in disruption of the tissues. Sweat glands and hair follicles may become occluded by the adhesive, and the evaporation of water vapour may be prevented.

Sometimes, in order to obtain adequate wound healing, the dressing must be changed often. Thus the repeated use of adhesive tape over the area of skin becomes a major factor in dressing changes. These tapes by nature are occlusive; that is they allow moisture to build up under them during wearing. This moisture over-hydrates and softens the outer layers of skin so that, when the tape is removed, these outer layers of skin are easily disrupted.

(d) Self-adherent wrap type bandages made of a crimped synthetic elastic material with a "bubbly" surface. When applied, they stretch. The nature of the surface of the bandage allows it to adhere together. An example is Coban marketed by 3M. When multi-layered, the porosity is abolished.

(e) Microporous tape made from a non-woven fibre with acrylic adhesives. Acrylic adhesive can be used repeatedly without causing trauma to the outer skin layers. There is permeability to liquid or water vapour only if applied as a single layer. However with overlapping, these advantages are lost. An example is Micropore tape marketed by 3M.

This type of tape does not stretch and cannot be used for compression.

Accordingly, the overlapping of porous dressings, bandages, strapping and plasters, adversely affects their porosity. This is a considerable disadvantage, with marked pathological effects on the skin and on wound healing.

Summary of the Invention

According to this invention, a bandage is made of an elastomeric net-like sheet material which by virtue of an increased friction coefficient does not slip when overlapped, with multi-layering. It may have means whereby it can interlock with itself, as it is overlapped on itself when wound around a part. This is achieved by increasing the thickness and altering the shape at the cross-over points. When layered on itself, the cross-over points will lock into the pores of the net/mesh.

Because of the elastic nature of a net mesh, it will stretch and will conform with the area bandaged and thus maintain the original bandaged position. Movement or sliding of the layered material over itself can be avoided. The non-slippage is increased by the interlocking component in the design. The bandage is thus particularly suitable for maintaining pressure, where desired. No adhesive is required. It is thus particularly suitable for medical use, although it may be used to wrap any object.

Description of the Invention

The self-locking bandage is of a different design to (d). The novel bandage is an integral elastopolymer mesh/net and, where the filaments intersect with each other (the junctures), the intersections are thickened in various shapes by increasing the volume of the polymer, preferably but not necessarily at each junction or intersection in three dimensions, so that there is a marked nubbing of the intersections as a "knob" or "blob" or "hook". When the elasticised bandage of the invention is stretched and applied (e.g. to a limb), in multilayering or overlapping on itself the projections at the junctions of any one layer

of the bandage interlock with both the adjacent inner and outer layers. The interlocking action combined with the high co-efficient of friction of the elastic polymer net material prevents the bandage from slipping and it thus maintains its conformity and pressure as required. The juncture points or "high spots" may be 5-10 times the thickness of the filaments and may be round, elliptical or squarish or any shape according to its method of manufacture, whether extrusion or moulding.

The pores of the netting may be square, rectangular, round or any shape depending on the technique of manufacture. The elastomer net may stretch in any direction with stretching ratios of from 3/1 to 10/1.

As the bandage is tensed during its application this stretching increase the size of the pores. Despite multi-layering and overlapping, the holes in the net are of such a size that the skin is never completely occluded. Because it is a net-like material with large holes it allows perspiration and with cooling of the skin prevents overheating at the surface.

In material of the present invention, the mesh dimension is substantially larger than the filaments, so that the fabric has a high open area. For example, the mesh size may be 0.5 to 10, e.g. 1.5 to 5, mm, while the filament size may be 0.1 to 2.5 mm, for example 0.2 to 1.5 mm. This high ratio, e.g. of 1:1 to 25:1, means that, when layers of a strip of material according to the invention are superimposed after the strip is wrapped around a body part, the body is not occluded. This may assist healing, and permits washing.

In material of the invention, and as indicated above, protuberances allow superimposed layers to interlock. The protuberances may be provided on one or both faces of the material. If provided on one face only, the other face will usually be the body-contacting face. The protuberances will most conveniently be provided at the intersections of the filaments of the material, as has

previously been proposed in order to provide increased strength at the intersections, although they may also be present elsewhere on the filaments. These protuberances do not need to be accurately proportioned to fit into the pores of the fabric.

The accompanying drawing shows a highly schematic partial plan view of material for use in the invention and also a schematic sectional view of the material when wrapped around on itself, e.g. over a wound (not shown). This view may be considered as an expanded section, or in a state prior to tightening, when the layers are brought into closer contact. The protuberances are staggered in superimposed layers, so that they interlock with the open mesh in one or both adjacent layers.

Another application of the elastomer netting as described comprises introducing a "filler" in the openings, e.g. an absorbent, air-permeable material. Such a material need not limit the elasticity or compromise the interlocking of the intersecting "knobs". For example, the openings of the net material may be filled with a cotton or synthetic wool type material, or paper material in a thin layer in such a way as to allow the expansile or stretching nature of the intersecting filaments. The elastic net bandage is able to incorporate a material for absorbency but remains compliant enough to allow the projecting junctions to enter the holes.

CLAIMS

1. An elongate strip of an integral reticulated elastomeric polymer material, in which the mesh dimension thereof is substantially larger than the filaments, and which has surface protuberances, for therapeutic use as a bandage by wrapping it around a body part so that layers thereof are superimposed and interlock, without occlusion of the body.

2. A strip according to claim 1, in which the mesh size is 1.5 to 5 mm.

3. A strip according to claim 1 or claim 2, in which the filament thickness is 0.2 to 1.5 mm.

4. A strip according to any preceding claim, additionally comprising an air-permeable absorbent filler material.

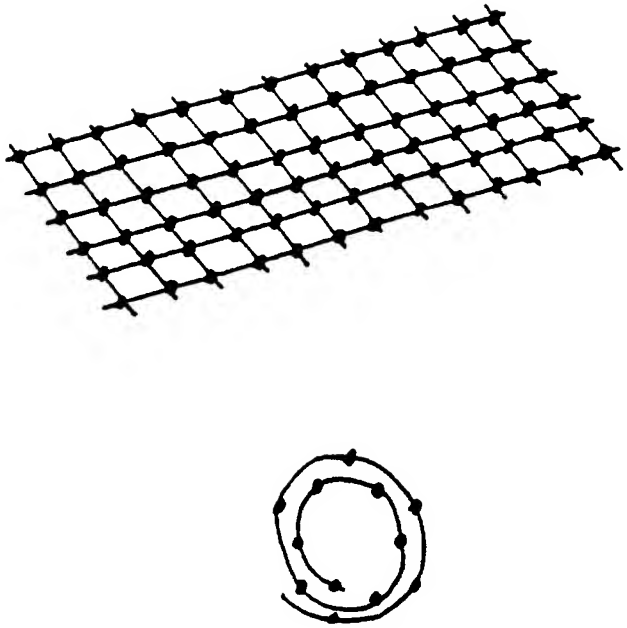


Fig. 1

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 97/00784

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61F13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 95 12373 A (SMITH & NEPHEW) 11 May 1995 see page 4, line 34 - page 5, line 19 see page 6, line 14 - line 31	1,2
A	US 4 235 237 A (F.K.MESEK ET AL.) 25 November 1980 see abstract; figure 1	1
A	US 4 921 704 A (T.FABO) 1 May 1990 see column 2, line 3 - line 10 see column 2, line 28 - line 36 see column 2, line 58 - line 59	1,3,4
A	GB 794 397 A (KIMBERLEY-CLARK) 30 April 1958 see page 6, line 63 - line 73; figure 9	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 July 1997	17.07.97

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Nice, P

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 97/00784

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9512373 A	11-05-95	AU 8110294 A	23-05-95
		CA 2175662 A	11-05-95
		CN 1139876 A	08-01-97
		EP 0726750 A	21-08-96
		GB 2298162 A	28-08-96
		ZA 9408671 A	04-07-95
US 4235237 A	25-11-80	NONE	
US 4921704 A	01-05-90	SE 455466 B	18-07-88
		CA 1329082 A	03-05-94
		DE 3775868 A	20-02-92
		EP 0261167 A	30-03-88
		JP 2525215 B	14-08-96
		JP 63502804 T	20-10-88
		SE 8601098 A	11-09-87
		WO 8705206 A	11-09-87
		US 5340363 A	23-08-94
GB 794397 A		NONE	